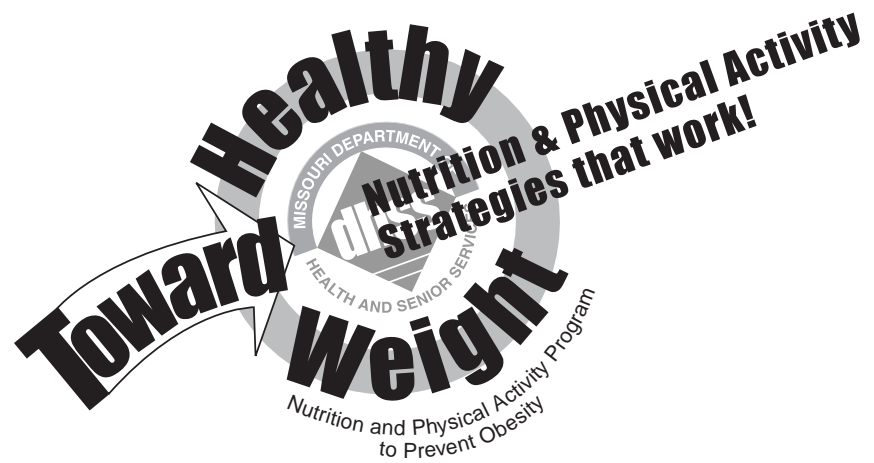


**Strategy for Reducing
Obesity and Other
Chronic Diseases:**

Increasing Fruit and Vegetable Consumption



Rationale

The dietary guidelines recommending that Americans consume 5 to 9 servings of vegetables and fruits daily are based on substantial scientific evidence.¹ Many studies have examined the relationship of vegetable and fruit consumption with the risk of cancer and other chronic diseases.² Increased consumption of vegetables and fruits has been clearly associated with decreased risk of cancer.^{3,4} Diets rich in vegetables and fruit have also been associated with reduced risk of cardiovascular disease and high blood pressure.^{5,6,7} Older women who eat 5 to 10 servings of vegetables and fruits daily have a 30 percent less risk of developing cardiovascular disease than those who eat 2 to 5 servings a day.⁸ Vegetables and fruits are low fat, low calorie, and high in water and fiber content, which may improve dietary satisfaction and weight control. There was a reduced energy intake by subjects when researchers added vegetables and fruits to meals.⁹ Juices are quickly digested and do not satisfy as well as whole

vegetables and fruit.¹⁰ Vegetable and fruit consumption should be incorporated into an overall healthy lifestyle that includes a diet adequate in dietary fiber, low in saturated fat and cholesterol and increased physical activity.¹¹

Although the relationship of eating vegetables and fruits and reducing the risk of certain types of cancers and chronic diseases is clear, effective strategies that result in increased vegetable and fruit consumption are not clearly available. Strategies have focused predominantly on behavior change prompted by communications—increase knowledge and understanding. While few of these strategies have been vigorously evaluated, particularly for actual behavior change, even less is known about effective strategies to increase accessibility through service delivery, environmental and policy interventions. Statistically significant increases in vegetable and fruit intakes have been reported more frequently for intervention studies based on

theory than for those not based on theory.¹² Theoretical models that have shown promise for 5 A Day interventions include: Transtheoretical Model/Stages of Change;^{13,14} Social Cognitive Theory¹⁵; and PRECEDE-PROCEED.¹⁶

The Healthy People 2010 includes objectives to have at least 75 percent of persons aged 2 years and older consume at least 2 servings of fruit per day and at least 50 percent consume 3 servings of vegetables per day, with at least 1 serving being dark green or orange vegetables.¹⁷ Despite emphasis on increasing the intake of vegetables and fruits, the percent of persons aged 2 years and older consuming the recommended number of vegetables per day decreased to 45 percent from 49 percent when the data from the United States Department of Agriculture Continuing Survey of Food Intakes by Individuals was combined from 1994-96 and 1998 and the percent consuming the recommended number of servings of fruits per day remained constant at 28 percent.¹⁸

(Continued, next page)

Evidence-Based Interventions

Following are examples of strategies based on selected tested interventions in the following settings: worksites, communities, faith-based organizations, and schools. Strategies are listed by approach: service delivery, policy, engineering (including environmental change) and communication. Guidelines for State and local components of the 5 A Day Program as well as the use of the logo and other resources provided by all partners may be accessed from the web: Center for Disease Control and Prevention (CDC) (www.cdc.gov/nccdphp/dnpa/5aday/index.htm), National Cancer Institute (www.5aday.gov), and the

Produce for Better Health Foundation (www.5aday.com). The CDC is a member of the national partnership of public and private organizations that promote the 5 A Day program.

Innovative Interventions

Examples of innovative interventions include mobile farmers market, guidelines—implement salad bars in every cafeteria, community or school gardens, require stores to display 5 A Day messages to qualify as a WIC vendor, Public Service Announcements (PSA's) or overhead messages in the workplace promoting vegetables and fruits, institute a health/medical committee or mission to set guidelines (faith-

based organizations), point of decision prompts on healthy dishes at group private dinners, provide nutrient analysis results on vegetables and fruits and competitive foods, and allow only selected foods in vending machines.

Adapted from the following

documents: Centers for Disease Control and Prevention Technical Assistance Manual for State Nutrition and Physical Activity Programs to Prevent Obesity and Other Chronic Diseases; Evidence Based Practices for Overweight and Obesity: A Review of the Literature, Glenda Nickell, Sinclair School of Nursing, University of Missouri-Columbia, 2003; Missouri Department of Health and Senior Services Draft Obesity Burden Report, 2004.

Workplace Strategies^{19,20} Community Strategies^{21,22,23,24} Faith-Based Strategies²⁵ School and Youth Strategies^{25,26}

Service Delivery	Policy	Environmental	Communication
Cafeteria and worksite events	Guidelines — implement Employee Advisory Boards and healthy vending machine selections	Increase cafeteria vegetable and fruit availability/place vegetables and fruits in vending machines	Posters/displays/table tents/5 A Day media materials (posters, fliers, brochures, videos)
Taste testing/cooking demonstrations	Change in catering policy	Nutrition information kiosks/point of choice labeling for vegetables and fruits	Newsletters/self-help manual
Taste testing/coupons for vegetables and fruits and cash incentive			5 A Day logo cues (magnets)
Discussion series/nutrition sessions led by peers			Printed materials/clue cards (mailed)/video/mail and telephone follow-up
Health fair/grocery/farmers' market (coupons offered)/cookbook taste testing	Guidelines for lay health advisors	Increase availability of vegetables and fruits at church functions	Video/newsletter/tailored bulletins, newsletters/5 A Day logo cues (magnet, pen)
Lay health advisors trained and help others			Incorporate spiritual themes in-tailored messages, sermons, and other communications
Taste testing/hands-on food preparation for students/workshops/monthly produce giveaways	Guidelines — offer salad bar or preplated salad	Increase vegetable and fruit availability in cafeterias	5 A Day logo items (i.e.: magnets)/table tents/calendars/brochures/posters/bulletin boards
Food service staff training	Guidelines — assist food service	Parental involvement (home environment)	Multi-lesson student curriculum

(Continued, next page)

References

- ¹US Dept of Agriculture, US Dept of Health and Human Services. Nutrition and Your Health: Dietary Guidelines for Americans (5th Edition). Home and Garden Bulletin No. 232. 2000. Washington, DC, USDA.
- ²National Research Council. Diet and Health: Implications for Reducing Chronic Disease Risk. Committee on Diet and Health, Food and Nutrition Board Commission on Life Sciences. 1989. Washington, DC, National Academy Press.
- ³Block G, Patterson B, Subar A. (1992) Fruit, vegetables, and cancer prevention. A review of the epidemiological evidence. *Nutr. Cancer* 18: 1-29.
- ⁴World Cancer Research Fund. Food, nutrition and the prevention of cancer: a global perspective. 1997. Washington, DC, American Institute for Cancer Research.
- ⁵Bazzano LA, He J, Ogden LG, Loria CM, Vupputuri S, Myers L, Whelton PK. (2002) Fruit and vegetable intake and risk of cardiovascular disease in US adults: The first National Health and Nutrition Examination Survey Epidemiologic Follow-up Study. *Am.J.Clin.Nutr.* 93-99.
- ⁶Law MR, Morris JK. (1998) By how much does fruit and vegetable consumption reduce the risk of ischaemic heart disease? *European Journal of Clinical Nutrition.* 52: 549-556.
- ⁷Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, Bray GA, Vogt TM, Cutler JA, Windhauser MM, Lin PH, Karanja N. (1997) A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. [see comments.]. *New England Journal of Medicine.* 336: 1117-1124.
- ⁸Liu S, Manson JE, Lee IM, Cole SR, Hennekens CH, Willett WC, et al. (2000) Fruit and vegetable intake and risk of cardiovascular disease: the Women's Health Study. [comment]. *American Journal of Clinical Nutrition.* 72: 922-928.
- ⁹Bell EA, Rolls BJ. (2001). Energy density of foods affects energy intake across multiple levels of fat content in lean and obese women. *American Journal of Clinical Nutrition,* 73: 1010-1018.
- ¹⁰Bolton RP, Heaton KW & Burroughs LF. (1981). The role of dietary fiber in satiety, glucose and insulin: studies with fruit and fruit juice. *American Journal of Clinical Nutrition,* 34: 211-217.
- ¹¹National Cancer Institute. Cancer Control: Objectives for the Nation, 1985-2000. 86-2880, Number 2. 1986. Washington, DC, Mayfield Publishing Company.
- ¹²Agency for Healthcare Research and Quality. Efficacy of interventions - modify dietary behavior related to cancer risk. Evidence Report: Technology Assessment (Summary). AHRQ Publication 01-E029, June 2000 (25), 1-4. 2000.
- ¹³Prochaska JO, DiClemente CC, Norcross JC. (1992) In search of how people change. Applications to addictive behaviors. *American Psychologist.* 47: 1102-1114.
- ¹⁴Campbell MK, Reynolds KD, Havas S, Curry S, Bishop D, Nicklas T, Palombo R, Buller D, Feldman R, Topor M, Johnson C, Beresford SA, Motsinger BM, Morrill C, Heimendinger J. (1999) Stages of change for increasing fruit and vegetable consumption among adults and young adults participating in the national 5-a-Day for Better Health community studies. *Health Education & Behavior.* 26: 513-534.
- ¹⁵Bandura A. (1986) Social Foundations of Thought and Action: A Social Cognitive Theory Prentice-Hall, Englewood Cliffs, NJ.
- ¹⁶Green LW, Kreuter KM. (1991) Health Promotion Planning: An Educational and Environmental Approach Mayfield Publishing Company, Mountain View, CA.
- ¹⁷US Department of Health and Human Services. Healthy People 2010 (conference ed. in 2 vols) Washington, DC: US Department of Health and Human Services, 2000.
- ¹⁸US Dept of Agriculture/Agricultural Research Service. 2000. Pyramid Servings Intakes by U.S. Children and Adults, 1994-1996, 1998. *Online.* ARS Community Nutrition Research Group Web site at <http://www.barc.usda.gov/bhnrc/cnrg>.
- ¹⁹Anderson JV, Bybee DI, Brown RM, McLean DF, Garcia EM, Breer, ML, Schillo BA. (2001) 5-a-day fruit and vegetable intervention improves consumption in a low-income population. *Journal of the American Dietetic Association.* 101: 195-202.
- ²⁰Sorensen G, Stoddard A, Peterson K, Cohen N, Hunt, MK, Stein E, Palombo R, Lederman R. (1999) Increasing fruit and vegetable consumption through worksites and families in the treatwell 5-a-day study. *American Journal of Public Health.* 89: 54-60.
- ²¹Beresford SA, Thompson B, Feng Z, Christianson A, McLerran D, Patrick DL. (2001) Seattle 5 a Day worksite program to increase fruit and vegetable consumption. *Preventive Medicine.* 32: 230-238.
- ²²Campbell MK, Demark-Wahnefried W, Symons M, Kalsbeek WD, Dodds J, Cowan A, Jackson B, Motsinger B, Hoben K, Lashley J, Demissie S, McClelland JW. (1999) Fruit and vegetable consumption and prevention of cancer: the Black Churches United for Better Health project. *American Journal of Public Health.* 89: 1390-1396.
- ²³Havas S, Anliker J, Damron D, Langenberg P, Ballesteros M, Feldman R. (1998) Final results of the Maryland WIC 5-A-Day Promotion Program. *American Journal of Public Health.* 88: 1161-1167.

(Continued, next page)

²⁴Resnicow K, Jackson A, Wang T, De AK, McCarty F, Dudley WN, Baranowski T. (2001). A motivational interviewing intervention to increase fruit and vegetable intake through Black churches: results of the Eat for Life trial. *American Journal of Public Health*. 91: 1686-1693.

²⁵Nicklas TA, Johnson CC, Farris R, Rice, R, Lyon L, Shi R. (1997) Development of a school-based nutrition intervention for high school students: Gimme 5. *American Journal of Health Promotion*. 11: 315-322.

²⁶Reynolds KD, Raczynski JM, Binkley D, Franklin FA, Duvall RC, Devane-Hart K, Harrington KF, Caldwell E, Jester P, Bragg C, Fouad M. (1998) Design of "High 5": a school-based study to promote fruit and vegetable consumption for reduction of cancer risk. *Journal of Cancer Education*. 13: 169-177.

This document was supported by Grant/Cooperative Agreement Number U58/CCU722795-02 from the Centers for Disease Control and Prevention. Contents are solely the responsibility of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health & Senior Services, Division of Community Health, Section of Chronic Disease Prevention and Health Promotion, PO Box 570, Jefferson City, MO 65102 573-522-2806

Hearing-impaired citizens may telephone 1-800-735-2966.
EEO/AAP services provided on a non-discriminatory basis.